A CASE OF BRAIN TUMOR SUCCESSFULLY LOCATED BY MEANS OF THE X-RAYS.

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The following case is reported because of the exceptional interest and importance of the *x*-ray picture. The tumor, which had undergone calcareous change, was clearly shown in the skiagram, and was removed. So far as we know, no case of brain tumor, in which the shadow was so clearly shown, has as yet been reported. As is well known, the *x*-rays are usually not of value in localizing these growths. In the present instance success was doubtless due to the fact that the tumor belonged to the class commonly known as psammomata, and was of very unusual size.

J. B., aged seventeen years, male, white. In early life, between the eighth and fifteenth years, the patient had had epileptic attacks, in one of which he fell and struck his right parietal region. This injury was thought to have some relation to his subsequent disorder. Following this fall the left arm and leg were affected with numbness and partial loss of power, which cleared up only after a long period. When aged fourteen years, the boy had a long attack of typhoid fever, after which he had no more epileptic attacks. In 1907 he was bitten by a dog, supposed to be mad, and took the Pasteur treatment.

The first symptoms of organic brain disease began one year before the patient came under our care. He began carrying his head to the right side, and had a sense of stiffness in the neck. Later he began to have an awkward gait, and his vision failed. There seems to have been little if any headache, at least no continuous headache. There had been some vomiting.

On admission to hospital the boy's condition was as follows: His gait was peculiar, the patient having a tendency to go toward the right side, holding his head rotated toward the right. He could walk without assistance across a room, but had difficulty in turning. His vision was evidently defective. There was no true loss of power in either the arms or legs. The knee-jerk was exaggerated on the left side and there was slight ankle clonus on the same side. On the left leg below the knee there was impaired sensation for touch, pain, heat, and cold. Elsewhere sensation was normal. None of the cranial nerves was involved, with the exceptions to be noted. The intelligence was clear, but possibly a little sluggish. There was no ataxia of the arms, no pain in the extremities. No speech defects.

Dr. Philip H. Moore reported moderate choked disk on both sides, more marked on the left. Media clear. No hemorrhages. Pupils reacted sluggishly to light and accommodation. Right external and superior oblique muscles showed restricted movements.

Dr. Walter Roberts reported no impairment of hearing. The Wassermann test was negative. The patient's general health was good; lungs, heart, and kidneys normal.

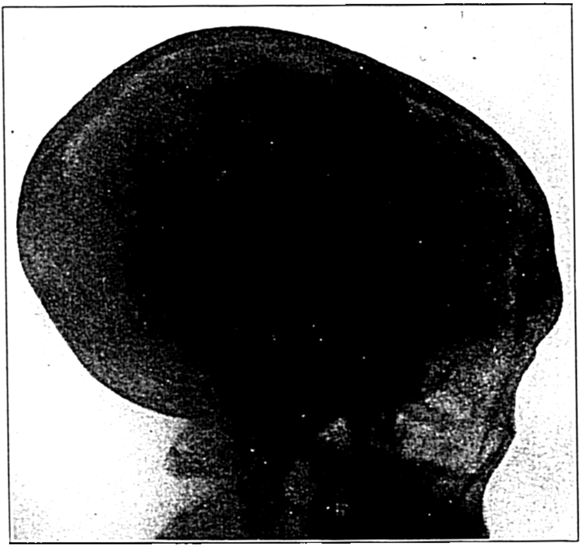

FIG. 1.—X-ray picture showing shadow of a brain tumor in the region of the temporal lobe.

The *x*-ray picture, taken by Dr. H. K. Pancoast, showed a very remarkable shadow. It was almost rectangular in shape, about 4 cm. long by not quite 2 cm. wide, and in the region of the temporal lobe (Fig. 1).

The patient was seen later in consultation by Dr. Dercum, at which time we decided on an operation, which was performed by one of us (Dr. Hammond) on June 6, 1911. The opening was made directly over the spot indicated by the x-rays, that is, in the lower part of the right parietal bone, which was found extremely thin. As soon as the opening was made the membranes bulged under great tension. When these were incised a cyst was entered, the fluid escaping in a large quantity and under pressure. Deep within this cyst cavity a hard bony mass was felt; this was also palpated by Dr. Charles H. Frazier, who witnessed the operation. This mass was attached deeply at its posterior part, and was freely movable at its anterior end. On account of its deep attachment it was decided not to attempt to remove the tumor at that time, but to wait and do a second operation, in the hope that, following the line of least resistance, the growth would tend to present at the opening in the skull.

The patient's recovery from the operation was prompt and most satisfactory. In fact, all his symptoms disappeared so completely, that it was difficult to believe, except from the testimony of the x-rays and of two highly competent surgeons, that he still carried a hard bony mass, as large as a pullet's egg, in the interior of his brain. His staggering gait was gone, the stiffness of his neck muscles, and consequent rotation of his head, disappeared, and his eyesight became practically normal. Two weeks after operation Dr. Moore found the disks much more clearly outlined, although there was still some haziness about the margin of the left. Pronounced choking had practically disappeared, and the faint outline of the cups was seen. Both nerve heads were pale in color, veins no longer engorged, and arteries normal. The retinæ showed numerous gray opacities, but much less cloudiness and swelling than before the operation. In short, the papillary edema had yielded promptly to decompression.

At this time, however, there was observed some slight astereognosis, such as inability to recognize a key and other objects placed in the left hand; but there was no anesthesia of any kind. The left knee-jerk was still exaggerated, and there was a slight Babinski reflex of the left great toe.

The patient continued in this favorable condition for the six weeks that he remained in the hospital after operation. He seemed so well that he was then allowed to go home in the interior of the State, still under careful supervision and direction. All went well for about another month, when it was observed that he was again losing sight, holding his head awry, and walking to one side. He was accordingly brought back to the hospital. On readmission his condition was very much as when first seen. All his symptoms had returned, and there was nothing to do for the boy but to operate.

At this time Dr. Moore made a very careful study of the visual fields and eyegrounds, and reported as follows: "Pupils large, round, and equal, reacting moderately to light and convergence.

Rotation of globes in all directions normal, with only slight restriction in the extreme temporal movement of the right eye. Media are clear. The right eye has a pale nerve head with distinct margin. The physiological cup is lost. The vessels seem somewhat reduced in size from normal. The retina is slightly cloudy in the lower central area. In the left eye the nerve is less pale than in the right, the nasal margin is hazy, and there is a swelling of possibly one diopter. The vessels present no great departure from normal. The retina is hazy in places, but there are no hemorrhages. The macular region is undisturbed. Vision (without glasses) for the right eye is $\frac{20}{100}$ and for the left eye is $\frac{20}{40}$. With glasses the vision for the right eye is $\frac{20}{50}$ and for the left eye $\frac{20}{30}$. The restriction of the fields of vision is shown by the accompanying charts, and careful plotting of the color fields shows an interlacing suggestive of hysteria."

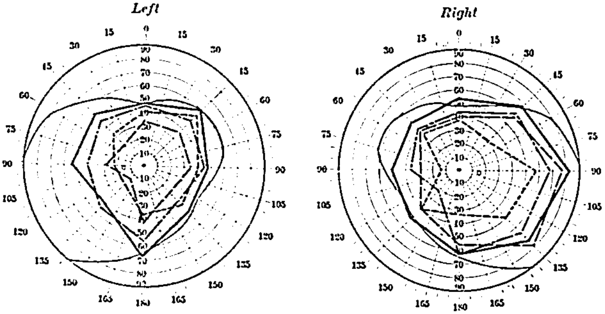

FIG. 2.—Perimeter charts showing restriction of the visual fields and interlacing of the color fields. Solid line = white; — — = red; — - — - — = blue; - - - = green.

One of us (Dr. Hammond) performed the second operation on August 19, more than two months after the first. The tumor was found *in situ*. It had a very peculiar feel to the finger, being like a rather rough stone, deep within the right hemisphere. It was taken out, however, in separate masses, or lobules, which came away without breaking. In other words, it consisted of several large masses and some smaller ones, closely packed together (almost like a nest of gallstones).

Description of Operation. The principles of asepsis were carried out by shaving the head, cleansing, and protecting the cavities accessory to the brain. Under ether anesthesia a free semilunar incision was made through the scalp and pericranium above and

1½ inches posterior to the right auricle, and the flap was reflected forward. A large trephine opening was made through the parietal bone, which was unusually thin; so thin, indeed, that the opening was additionally enlarged by paring off bone with the ordinary sized-curved scissors. Immediately on removal of the bony plate internal pressure was so great that a large protrusion filled the opening.

The layer of brain substance beneath the dura was flattened and thinned from the pressure of the fluid in the cyst, which was encapsulated and superficial to the growth. After the rupture of the cyst wall and escape of its fluid contents, the tumor could readily be felt deeply seated above the tentorium and apparently adherent to the falx cerebri in a thin capsule of its own. It was irregular in outline, presenting to the sense of touch at least three distinct nodules. It was not difficult with a pair of long tissue forceps to grasp and remove each of these nodules separately. Hemorrhage, which was not excessive, was controlled by gauze packing. Drainage was inserted, the dura and pericranium carefully approximated over the convolutions, and the scalp sutured. The wound healed by primary union.

The patient stood the operation fairly well, but his condition was never as favorable as after the first operation. He began to fail about the sixth day, developing what was probably a uremic condition, for albumin and casts appeared in his urine, and on the eighth day he had a convulsion. From this he never fully recovered, and died on the same day. An autopsy unfortunately was refused.

It is of interest to note that the patient had been seen and examined by Dr. Charles W. Burr almost one year before he came under the care of one of us (Dr. Lloyd), and that Dr. Burr's notes closely correspond to ours. At that time, however, Dr. W. C. Posey reported a left homonymous hemianopsia, but this was not present at any time when the patient's eyes were examined by Dr. Moore, except that the left half of the right field was somewhat narrowed. In this respect there had evidently been some change in the interval of a year.

The location of the shadow in the *x*-ray photograph indicated a tumor within the posterior part of the right temporal lobe. It was too low to be in the parietal, or parietoöccipital area. This we verified by comparing it carefully with the cast of a brain. This situation may indicate that this tumor, as in the case of most psammomata, sprang from the choroid plexus, and the cyst may even have communicated with the middle horn of the lateral ventricle. If this was so, we succeeded in tapping the ventricle without knowing or intending it. The absence of localizing symptoms is accounted for by the fact that this is a comparatively silent region of the brain. If the growth had been on the left side we should doubtless have had some speech defects. It was too far away to involve the internal capsule, except a small portion of the sensory paths, as indicated by the anesthesia of the left leg below the knee. The patient's gait was somewhat like that caused by a cerebellar lesion, in the tendency to go to one side, but it was not a true cerebellar ataxia or titubation. We have no satisfactory explanation to offer of the astereognosis of the left hand, unless the tumor, as is often the case with brain tumors, caused more widespread pressure and interference with function than would appear probable from its location.

The microscopic sections were made by Dr. Ellen Corson White, who had some difficulty in decalcifying the material. These sections have been very kindly examined by Professor Allen J. Smith, who gave the following opinion:

"Section of brain tumor submitted by Dr. Lloyd, showed scarcely any matrix, but a great number of concentric psammoma bodies, which were merged in discrete and large fields, as if united after formation into a mass by the deposit of an intervening silicious material of the same character as that in the discrete bodies. In preparing the material for sections, Dr. White had found it impossible to decalcify, which was evidently dependent upon the fact that the concretions were not of plain calcareous nature, but of sand or silicious character. The little stroma recognizable which had refused staining and clear differentiation, probably partly from the action of the decalcifying agents, was evidently of a fibrous nature. From the deep location of the tumor the writer believes the growth probably started from the fibrous tissue of some of the bloodvessels of the cerebral substance."

The opinion of pathologists seems generally to be that these psammomata usually spring from the choroid plexus or pineal gland. Brain sand, as it is generally called, is not infrequently found in this location. The striking characteristic of the present case is the very large size of the psammoma and its great density. Tumors of various tissues, however, such as sarcomata, tuberculomata, fibromata, and lipomata, may undergo some calcareous change, but the change is seldom so complete. Two recent German writers, Zuckermann[1] and Hecht,[2] reporting such calcareous tumors of the brain, suggest that they may be teratoid or of the nature of dermoids, but this suggestion is not original, for dermoid tumors containing bone, teeth, and hair, have been found in the pituitary body and in the lateral ventricles.[3]

The *x*-ray picture in this case is a remarkable one, showing the shadow of the tumor very plainly, also the convolutions both of the cerebrum and of the cerebellum. This clear shadow is, of course, due to the hard bony nature of the tumor. We are not aware that any skiagram of a brain tumor has yet been published as remarkable as this one, an opinion expressed also by Dr. Pancoast, who took the picture. In looking at this skiagram we were struck with the clear delineation of the convolutions, and even thought that they showed some degree of flattening or pressure. This suggests a possibility in future cases in which no tumor shadow may be produced. It would, indeed, be interesting and important if we could attain such skill in interpreting skiagrams of the brain as clearly to determine the action of undue pressure beneath the convolutions.

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[1] Virchow's Archiv, 1911, Band cciii, Heft 2, S. 161.

[2] Ibid., S. 165.

[3] Beck, Zeitsch. f. Heilkunde, 1884; Gowers, Dis. New Syst., 2d ed., xi, 499, footnote.

THE RÖNTGEN RAYS IN HYPERTROPHIED PROSTATE: A THERAPEUTIC STUDY.[1]

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A casual glance at the enormous literature upon the treatment of hypertrophied prostate would lead one invariably to the conclusion that this is a disease amenable to a great diversity of procedures and consequently likely to give the attending physician but little trouble. Upon further investigation, however, especially when one has had some experience of his own, we must conclude that here, as elsewhere, when a great number of treatments are suggested, few are of value and none specific.

The ideal treatment in cases of hypertrophied prostate is, of course, its radical removal. In the hands of skilful operators the results are excellent. Thus, Judd,[2] reports a mortality of only 29 (from kidney lesions within two months) out of a total of 542 cases operated on by the Mayos. Young's[3] statistics are somewhat better, a mortality of 13 in 400 cases. "During a period of two years and eight months," he writes, "128 consecutive cases were subjected to the operation of conservative perineal prostatectomy without a single fatal result, all of the patients returning to their homes. Forty-three of these cases were over seventy years of age, and 2 were over eighty years of age." Such are the results with selected cases in the hands of our greatest operators. In the ordinary run of cases, however, subjected to the general surgeon, we must expect, as in any other major operation upon elderly people, a high mortality. At least, this is the experience with most of my surgical friends. And what of the inoperable cases? What of those with cardiac, vesical, and renal lesions?

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[1] Read at the meeting of the American Röntgen Ray Society, Richmond, Va., September 20, 1911.

[2] Jour. Amer. Med. Assoc., 1911, lviii, 458.

[3] Jour. Amer. Med. Assoc., 1910, liv, 790.